



## Tragedy Strikes

- 2 months later, Tony has been going to physical therapy and trying to go for walks around his neighborhood every day.
- One misty morning he catches his foot on the curb and falls, fracturing his R hip.
- **Ortho team consults and recommends surgery.**
  - They tell you they have some experience working with patients who are prescribed buprenorphine, and they typically recommend stopping it the day before surgery.
    - *Do you agree?*

# Questions

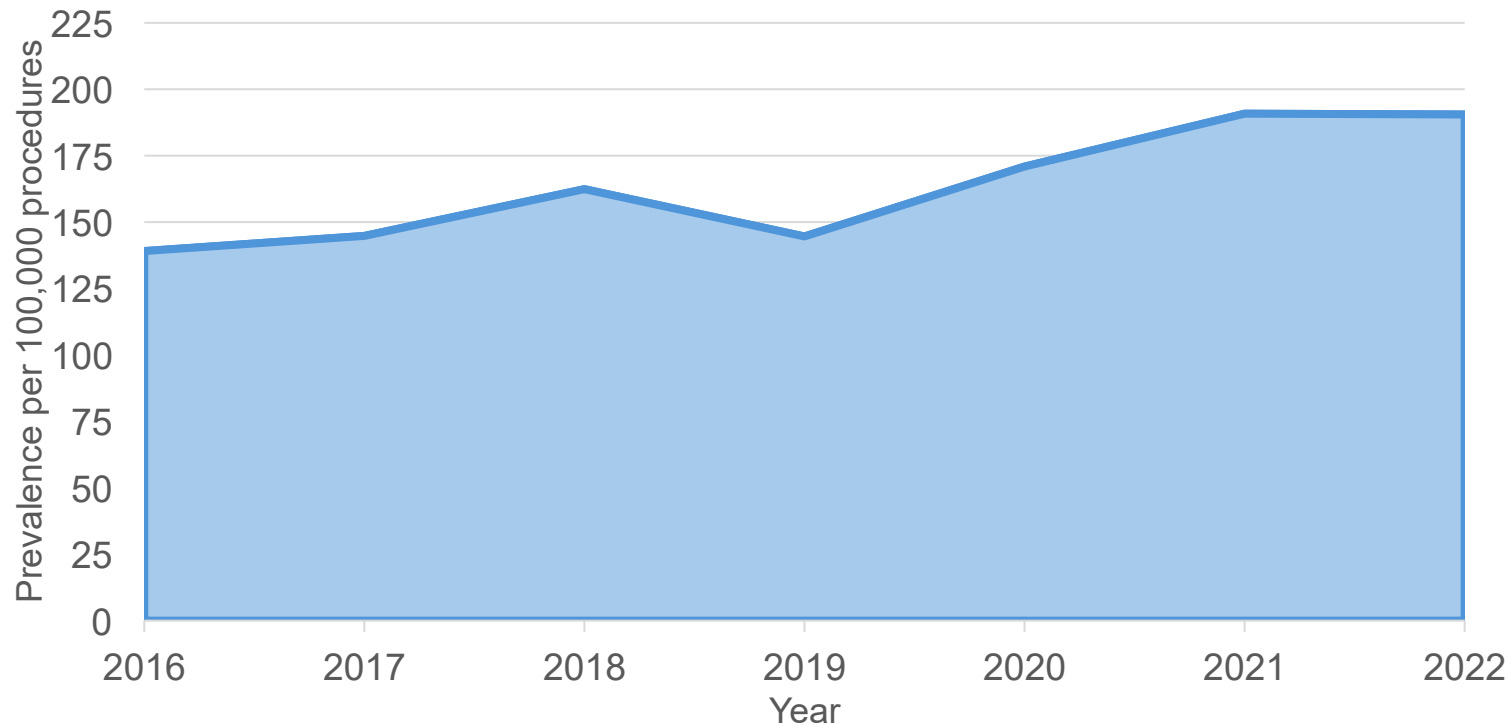
What are the concerns regarding continuing vs discontinuing Buprenorphine?

Does it matter if the pt is taking Buprenorphine for COPD vs OUD?

How to Best Education your Patient on Perioperative Pain Control?

# More Surgical Patients On Buprenorphine

Trends in Buprenorphine Use Before Surgery, 2016-2022



↑ **36% increase**  
Among commercially insured patients

# Buprenorphine Maintenance Therapy: Continue or Stop?

- Discontinuation of buprenorphine exposes the patient to the substance of addiction and may lead to relapse

Review > [J Subst Abuse Treat](#). 2015 May;52:48-57. doi: 10.1016/j.jsat.2014.12.011. Epub 2014 Dec 30.

## Discontinuation of buprenorphine maintenance therapy: perspectives and outcomes

Brandon S Bentzley<sup>1</sup>, Kelly S Barth<sup>2</sup>, Sudie E Back<sup>3</sup>, Sarah W Book<sup>4</sup>

Affiliations + expand

PMID: 25601365 PMCID: [PMC4382404](#) DOI: [10.1016/j.jsat.2014.12.011](#)

[Free PMC article](#)

> [Br J Anaesth](#). 2019 Aug;123(2):e333-e342. doi: 10.1016/j.bja.2019.03.044. Epub 2019 May 29.

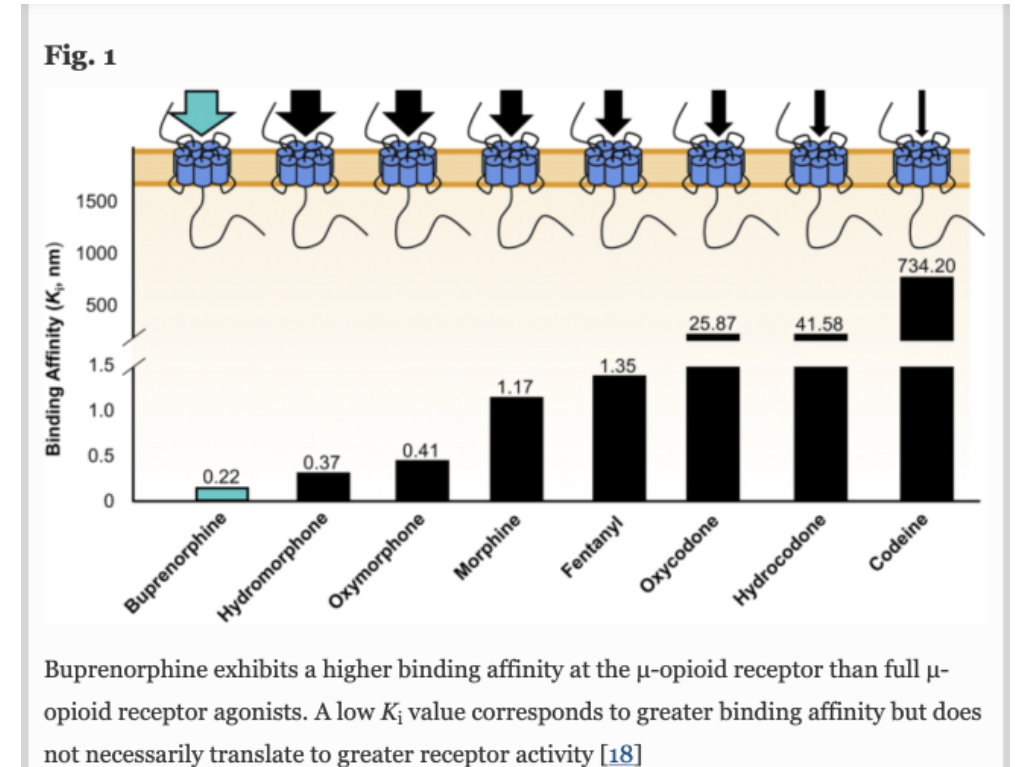
## Perioperative Pain and Addiction Interdisciplinary Network (PAIN) clinical practice advisory for perioperative management of buprenorphine: results of a modified Delphi process

Akash Goel<sup>1</sup>, Saam Azargive<sup>2</sup>, Joel S Weissman<sup>3</sup>, Harsha Shanthanna<sup>4</sup>, John G Hanlon<sup>5</sup>, Bana Samman<sup>5</sup>, Mary Dominicus<sup>5</sup>, Karim S Ladha<sup>5</sup>, Wiplove Lamba<sup>6</sup>, Scott Duggan<sup>7</sup>, Tania Di Renna<sup>5</sup>, Philip Peng<sup>5</sup>, Clinton Wong<sup>8</sup>, Avinash Sinha<sup>9</sup>, Naveen Elpe<sup>10</sup>, David Martell<sup>11</sup>, Howard Intrater<sup>12</sup>, Peter MacDougall<sup>10</sup>, Kwesi Kwofie<sup>13</sup>, Mireille St-Jean<sup>14</sup>, Saifee Rashid<sup>15</sup>, Kari Van Camp<sup>16</sup>, David Flamer<sup>5</sup>, Michael Satok-Wolman<sup>16</sup>, Hance Clarke<sup>17</sup>

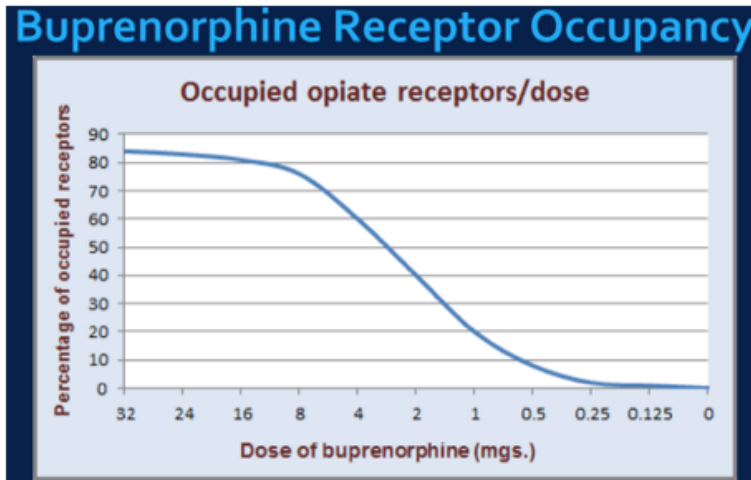
- Continuing buprenorphine occupies the receptors making them unavailable for other opioids
  - Does this provide poorer analgesia?

# Buprenorphine

- High binding affinity for the MOR
  - Will displace other opioid ligands
    - May precipitate withdrawal
  - Once in place prevents additional opioid binding

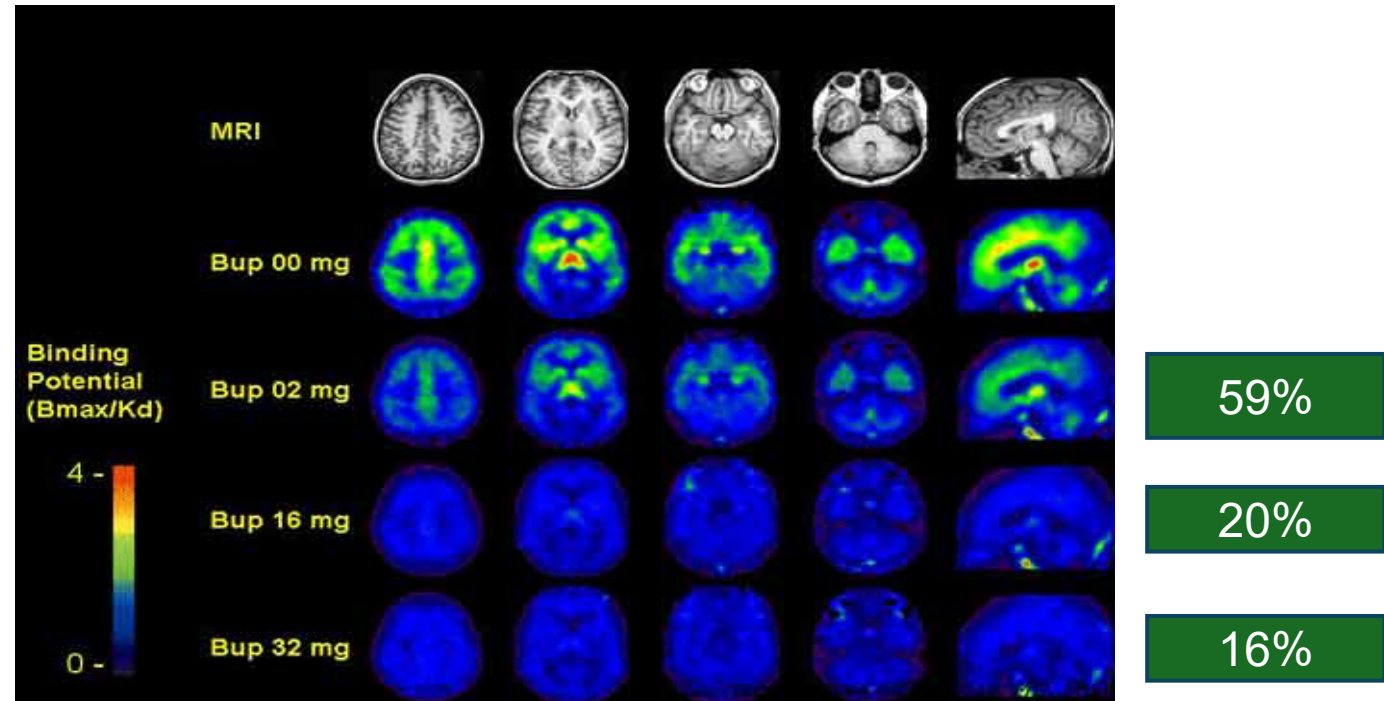


# Buprenorphine Receptor Binding



**Table 2** Estimates of MOR occupancy based on buprenorphine dose

Dose	Low estimate (%)	High estimate (%)
1 mg [187]	15	29
2 mg [187-189]	28	74
4 mg [187]	45	64
8 mg [187, 189]	78	83
12 mg [187]	76	87
16 mg [188]	79	95
24 mg [187]	85	96
32 mg [187-190]	88	95-98



Greenwald, M.K. et al. Effects of Buprenorphine Maintenance Dose on  $\mu$ - opioid receptor availability. *Neuropharmacology* (2003) 28, 2000-2009

<https://accurateclinic.com/accurate-education-pain-medications-buprenorphine/>

Miller JC, Brooks MA, Wurzel KE, Cox EJ, Wurzel JF 3rd. A Guide to Expanding the Use of Buprenorphine Beyond Standard Initiations for Opioid Use Disorder. *Drugs R D*. 2023 Dec;23(4):339-362. doi: 10.1007/s40268-023-00443-5. Epub 2023 Nov 8. PMID: 37938531; PMCID: PMC10676346.

**Can we Provide  
Adequate Analgesia?**

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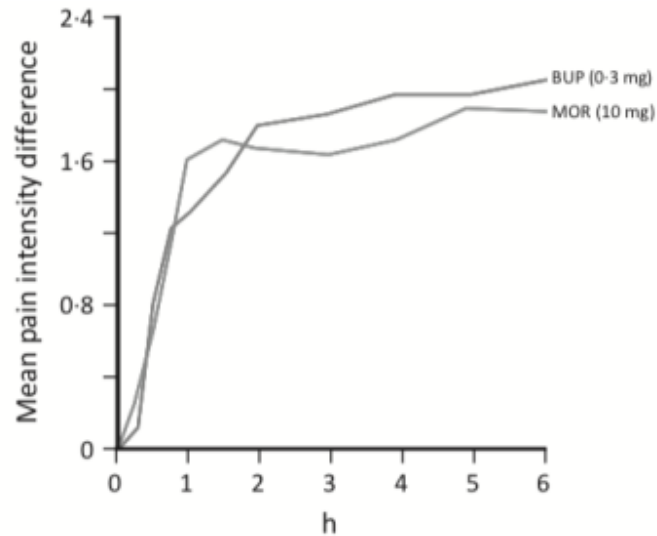
## Commentary

### The clinical analgesic efficacy of buprenorphine

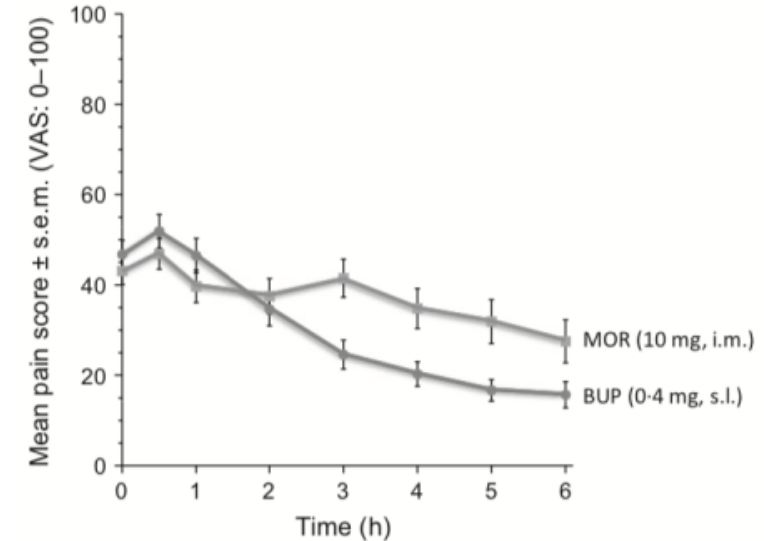
R. B. Raffa\* PhD, M. Haidery\* PharmD, H.-M. Huang\* PharmD, K. Kalladeen\* PharmD, D. E. Lockstein\* PharmD, H. Ono\* PharmD, M. J. Shope\* PharmD, O. A. Sowunmi\* PharmD, J. K. Tran\* PharmD and J. V. Pergolizzi†‡§ Jr MD

\*Temple University School of Pharmacy, Philadelphia, PA, †Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD,

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**Fig. 1.** The analgesic efficacy of i.m. buprenorphine (0.3 mg) was compared with that of i.m. morphine (10 mg) for post-operative pain relief in a randomized, double-blind, multiple-dose, non-crossover trial involving 60 patients (26M/34F; 17–78 years) scheduled for upper abdominal surgery. Post-op pain intensity was assessed using a visual analog scale (0 = none, 1 = slight, 2 = moderate, 3 = severe) and measured prior to the first dose of drug and every 15 min thereafter up to 2 h and every hour thereafter up to 6 h post-injection. Morphine and buprenorphine produced similar decreases in pain intensity. Redrawn from Tigerstedt and Tammisto.<sup>16</sup>



**Fig. 2.** The analgesic efficacy of s.l. buprenorphine (0.4 mg) was compared with that of i.m. morphine (10 mg) in a randomized, double-blind study of post-op pain of 101 patients (mean age: 40–45 years). Pain was measured using a 10-cm pain scale (0 = none, 10 = as much as imaginable). Buprenorphine produced the same pain relief as did morphine during the first 2 h and modestly greater pain relief from 2 to 6 h. Redrawn from Edge *et al.*<sup>22</sup>

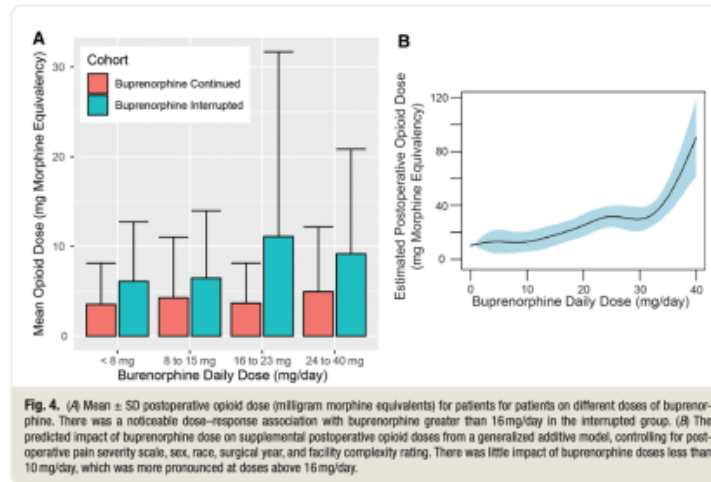
# Perioperative Buprenorphine and Methadone

- Pain relief and opioid requirements in the first 24 hours after surgery in patients receiving buprenorphine and methadone medication assisted treatment (MAT)
  - **No difference in pain** intensity ratings in patients who **continue or discontinue** on POD1
  - Patients who **discontinue** use **large quantities** of IV-PCA opioid
  - Authors recommend continuing buprenorphine
  - Buprenorphine provides significant analgesia

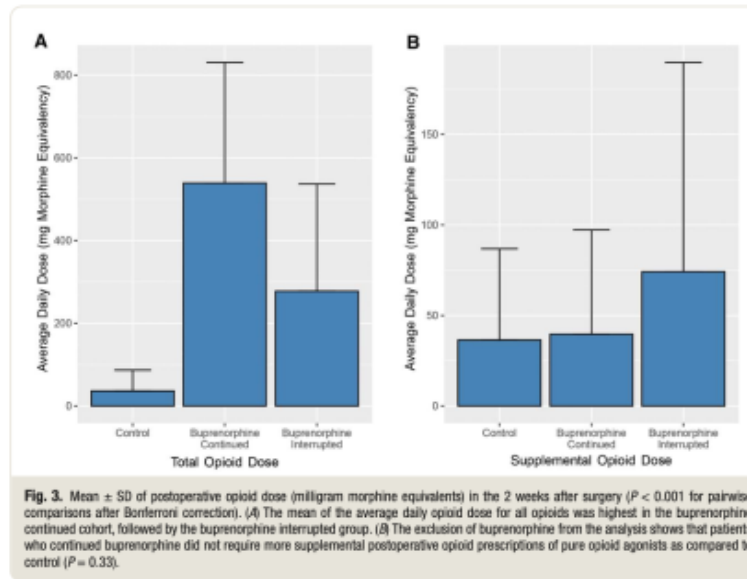
**Continuation versus Interruption of Buprenorphine/ Naloxone in Adult Veterans Undergoing Surgery: Examination of Postoperative Pain and Opioid Utilization in a National Retrospective Cohort Study**

James M. Hitt, M.D., Ph.D., Peter L. Elkin, M.D., Oscar A. de Leon-Casasola, M.D.

ANESTHESIOLOGY 2025; 142:320–31



**Fig. 4.** (A) Mean ± SD postoperative opioid dose (milligram morphine equivalents) for patients for patients on different doses of buprenorphine. There was a noticeable dose-response association with buprenorphine greater than 16 mg/day in the interrupted group. (B) The predicted impact of buprenorphine dose on supplemental postoperative opioid doses from a generalized additive model, controlling for postoperative pain severity scale, sex, race, surgical year, and facility complexity rating. There was little impact of buprenorphine doses less than 10 mg/day, which was more pronounced at doses above 16 mg/day.



**Fig. 3.** Mean ± SD of postoperative opioid dose (milligram morphine equivalents) in the 2 weeks after surgery ( $P < 0.001$  for pairwise comparisons after Bonferroni correction). (A) The mean of the average daily opioid dose for all opioids was highest in the buprenorphine continued cohort, followed by the buprenorphine interrupted group. (B) The exclusion of buprenorphine from the analysis shows that patients who continued buprenorphine did not require more supplemental postoperative opioid prescriptions of pure opioid agonists as compared to control ( $P = 0.33$ ).

- Average post operative pain scores within 72 hours of sx were clinically similar in the 3 groups

# Postop Pain Management

- No clear benefit to stopping and poses risk of relapse<sup>1</sup>
- Pts who discontinued buprenorphine have greater than 50% chance of relapse or death<sup>2</sup>
- Increased risk of overdose due to decrease in tolerance if discontinued<sup>2</sup>

1

2020 23E163-74

2. Bentzley et al: J Subst Abuse Treat 2015; 52:48-57

## Continuing Chronic Buprenorphine Perioperatively is Associated With Reduced Postoperative Opioid Use

William J. Olney, BS, PharmD, BCCCP,<sup>a,\*</sup>  
Eric G. Johnson, PharmD, BCCCP,<sup>a,b</sup> Cassidy Potts, PharmD,<sup>b</sup>  
J. Thomas Murphy, MD, FRCPC, FASAM,<sup>c,d</sup>  
and Douglas R. Oyler, PharmD<sup>b</sup>

<sup>a</sup> Department of Pharmacy, University of Kentucky Medical Center, Lexington, Kentucky

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<sup>d</sup> University of Kentucky College of Medicine, Lexington, Kentucky

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- **Single-center retrospective** study at a **Level 1 trauma academic medical center**.
- Included: Adults on **outpatient buprenorphine** admitted with an operative booking.
- Groups:
  - **Continuation group** – buprenorphine maintained in hospital
  - **Withheld group** – buprenorphine stopped during admission
- **Primary outcome:** Any use of full  $\mu$ -opioid agonists during admission days 1–7.
- **Secondary outcomes:** Length of stay (LOS), average pain scores (POD1 and POD7).

# Outcomes

## Primary Outcome: Opioid Requirements

- **43.4%** of patients who **continued buprenorphine** required **no full  $\mu$ -agonists** during days 1–7.
- Only **3.1%** of those in the **withheld group** avoided full  $\mu$ -agonists.
- **P < 0.001** → **Highly significant reduction** in opioid use when buprenorphine was continued.

## Pain Scores

- No statistically significant difference in **average pain scores**:
  - POD1: **5.2 vs. 6.9** (P = 0.82)
  - POD7: **0 vs. 0** (P = 0.41)

Interpretation: **Continuation did not worsen pain control and required fewer full agonists.**

## Length of Stay

- LOS showed **no significant difference**:
  - 4.7 days (2.8–6.6) vs. 6.1 days (4.0–8.2)
  - **P = 0.36**

# Key points

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**Continuing buprenorphine perioperatively significantly reduces the need for supplemental full  $\mu$ -agonists**, without worsening pain or increasing LOS.

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Pain scores remained **comparable** when buprenorphine was continued.

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Findings support current evolving practice patterns and guidelines that favor **continuation rather than interruption** in most surgical patients with OUD.

**Does Dose,  
Diagnosis, or Type of  
Surgery Matter?**

# Buprenorphine Formulations

Formulation	Indication	Strengths	Frequency	Nalox
Sublingual tablet (generic)	Opioid dependence	2 mg; 8 mg	Once daily	N
Sublingual tablet, film (generic, Suboxone)	Opioid dependence	2 mg/0.5 mg; 4 mg/1 mg; 8 mg/2 mg; 12 mg/3 mg	Once daily	Y
Sublingual tablet (Zubsolv)	Opioid dependence	0.7 mg/0.18 mg; 1.4 mg/0.36mg 2.9 mg/0.71 mg; 5.7 mg/1.4 mg; 8.6 mg/2.1 mg; 11.4 mg/2.9 mg	Once daily	Y
Buccal film (Bunavail)	Opioid dependence	2.1 mg/0.3 mg; 4.2 mg/0.7 mg; 6.3 mg/1 mg	Once daily	Y
Buccal film (Belbuca)	Chronic pain	75 mcg; 150 mcg; 300 mcg; 450 mcg; 600 mcg; 750 mcg; 900 mcg	Every 12 hours	N
Intravenous (Buprenex)	Acute pain	0.3 mg/mL	Every 6 hours as needed	N
Subcutaneous extended release injection (Sublocade)	Moderate-to-severe opioid use disorder	100 mg/0.5 mL; 300 mg/1.5 mL	Monthly	N
Transdermal patch (Butrans)	Chronic pain	5 mcg/hr; 7.5 mcg/hr; 10 mcg/hr; 15 mcg/hr; 20 mcg/hr	Every 7 days	N

Warner NS, Warner MA, Cunningham JL, et al. A Practical Approach for the Management of the Mixed Opioid Agonist-Antagonist Buprenorphine During Acute Pain and Surgery. *Mayo Clin Proc.* 2020;95(6):1253-1267.

**Table 5** FDA-approved buprenorphine formulations for MOUD and analgesia<sup>50</sup>

**Milligram formulations of MOUD**

Buprenorphine +naloxone	Buprenorphine
Sublingual tablets (Zubsolv)	Sublingual tablets
Sublingual film (Suboxone)	ER solution for injection (Sublocade, Brixadi*)
Buccal film (Bunavail)	

**Microgram formulations for analgesia†**

Transdermal patch (Butrans) weekly application
Buccal film (Belbuca)

\*Tentative approval from FDA (not eligible for marketing in the USA. Date to be determined (TBD).

†Low abuse potential.<sup>146 147</sup>

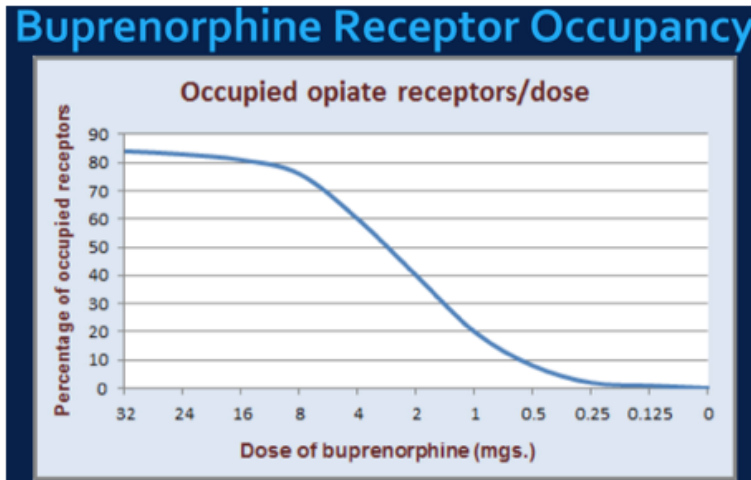
ER, extended release; FDA, Food and Drug Administration; MOUD, medication treatment of opioid use disorder.

**Table 6** Buprenorphine dosage formulations

	Suboxone SL	Zubsolv SL	Sublocade ER subcutaneous	Bunavail buccal
Equivalent dose of SL	8 mg/2 mg	5.7 mg/1.4 mg	100 mg/0.5 m	4.2 mg/0.7 mg

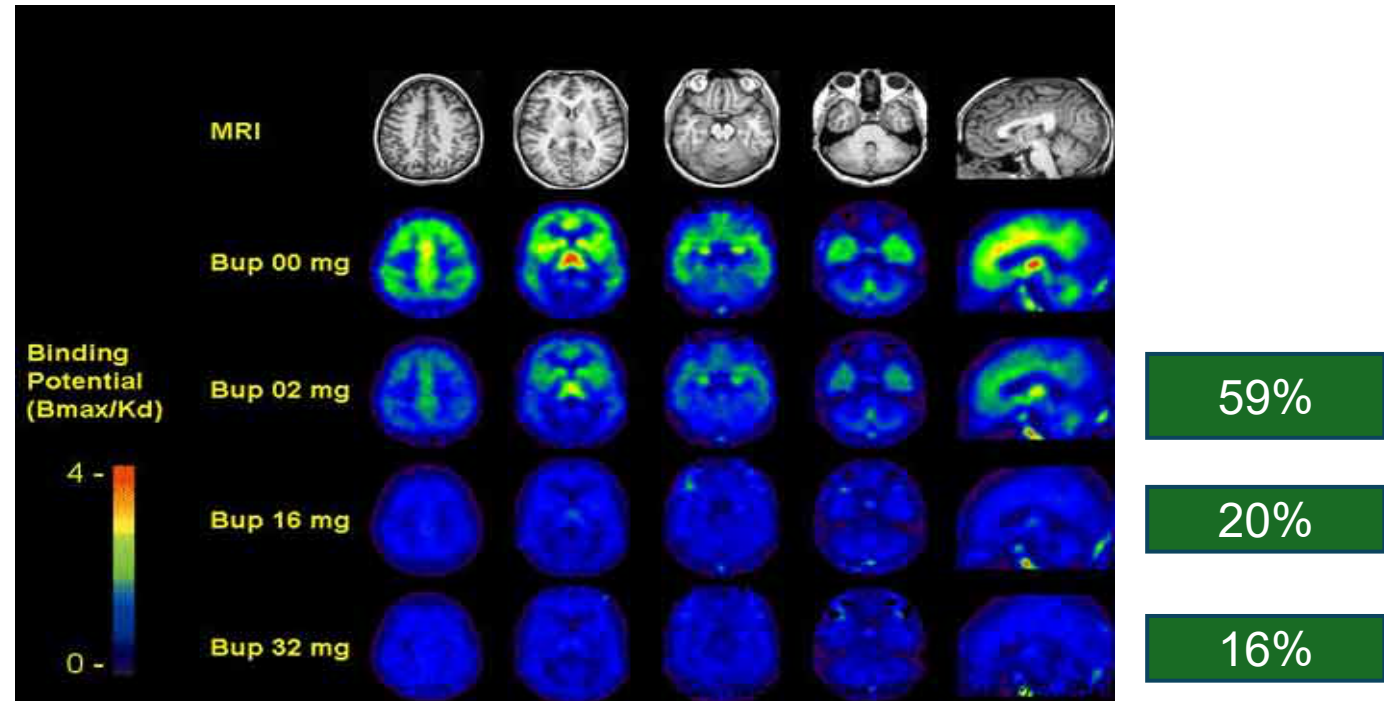
ER, extended release; SL, sublingual.

# Buprenorphine Receptor Binding



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# The Efficacy of Buprenorphine in Preoperative and Postoperative Patients: A Literature Review

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- 
- **Lumbar discectomy trial:** Sublingual buprenorphine given preoperatively significantly lowered postoperative pain scores at 1, 6, and 12 hours and reduced rescue analgesic use.
  - **Knee arthroscopy:** Intra-articular buprenorphine resulted in lower pain scores at 12 and 24 hours and prolonged time to first rescue analgesic compared with dexmedetomidine.
  - **Acute abdomen in opioid-dependent patients:** Sublingual buprenorphine produced lower pain scores and fewer withdrawal symptoms than IV morphine.
  - **Transdermal formulations:**
    - Buprenorphine 20 µg/hr patch provided superior 24-hour postoperative analgesia compared to fentanyl 25 µg/hr and buprenorphine 10 µg/hr.
    - Combining a buprenorphine patch with diclofenac reduced the need for rescue analgesia after laparoscopic cholecystectomy.

What are you going to tell  
Tony?

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# Postoperative Pain Experience: Results from a National Survey Suggest Postoperative Pain Continues to Be Undermanaged

Jeffrey L. Apfelbaum, MD\*, Connie Chen, PharmD†, Shilpa S. Mehta, PharmD†, and Tong J. Gan, MD‡

\*Department of Anesthesia and Critical Care, The University Chicago Hospitals, Chicago, Illinois; †Pharmacia Corp., Skokie, Illinois; and ‡Department of Anesthesiology, Duke University Medical Center, Durham, North Carolina

**Table 2.** Patient Concerns Before Undergoing Surgery

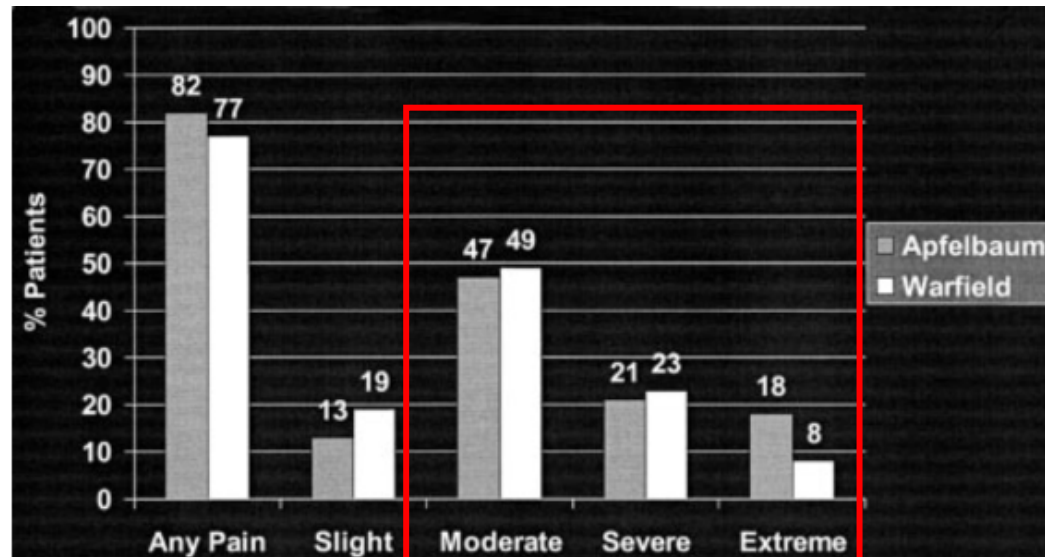
Concern <sup>a</sup>	Inpatient (n = 129)	Outpatient (n = 121)	Total (n = 250)
Pain after surgery	57%	61%	59%
Whether surgery would improve condition	47%	55%	51%
Full recovery from surgery	50%	41%	46%
Pain during surgery	36%	30%	33%
Treatment by health care professionals	32%	27%	30%
Don't know/refused	19%	12%	16%

<sup>a</sup> Patients could choose more than one concern.

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\*Department of Anesthesia and Critical Care, The University Chicago Hospitals, Chicago, Illinois; †Pharmacia Corp., Skokie, Illinois; and ‡Department of Anesthesiology, Duke University Medical Center, Durham, North Carolina



- Baseline Buprenorphine does not provide adequate surgical analgesia
  - Analgesic effect is 6-8 hours
- Pt's still need additional periop analgesia



# Education

- Assure pt that you understand that managing pain is primary goal
  - Set realistic expectations
  - Buprenorphine will be continued throughout the periop period
  - A comprehensive multimodal tx plan will be used
  - Additional pain medications may be used
    - Taper will be provided for any additional pain medications
  - Coordination of care
-

# Recommendations for Postoperative Management

Clinical Pearl: Buprenorphine home dose should not be routinely discontinued or tapered perioperatively

All surgery types (elective, urgent, emergent)

## Buprenorphine Management

### Mild/Moderate Pain:

- Home bupre-norphine dose can be split into two times per day/three times per day dosing to provide an analgesic effect.

### Severe Pain:

- Home buprenorphine dose can be split into three times per day dosing to provide improved analgesic effect.
- Consider increasing dose of buprenorphine to 24-32 mg given in divided doses or using buprenorphine intravenous 0.3 mg every 6 hours prn
- Consider close monitoring if increasing or adding opiate for pain

## Acute Pain with Other Opioids

- Maximize non-opioid strategies
- Treat acute pain with high affinity additional opioids as indicated in patients with OUD, avoid the opioid of past misuse
- Fentanyl derivatives and hydromorphone likely to be most effective due to high receptor affinity
- Consider close monitoring if increasing or adding opiate for pain

## Nonopioid Pharmacological Management

- Regional anesthesia (Epidural catheter, Transversus Abdominus Plane block, peripheral nerve blocks with or without catheters including but not limited to erector spinae plane blocks, paravertebral block, femoral/adductor canal block, etc)
- Local infiltration by surgical team
- Intraoperative or postoperative ketamine/lidocaine/magnesium infusions
- Consider Dexmedetomidine if Intravenous sedation used postoperatively
- Topical agents (e.g. ice, lidocaine ointment or patches)
- NSAIDs when indicated (e.g. ketorolac, ibuprofen, etc)
- Intravenous vs. oral acetaminophen when indicated
- Antineuropathic agents when indicated or if comorbid anxiety (e.g. gabapentinoids, antidepressants such as TCAs, SNRIs, etc)
- Muscle relaxants as indicated (e.g. baclofen, tizanidine, cyclobenzaprine; avoid benzodiazepines or carisoprodol)

## Non-Pharmacological Management

- Ice to surgical site
- Position change
- Relaxation strategies and mindfulness techniques for pain (e.g. guided "apps" such as the free app "Calm")
- Peer recovery support
- Distraction aligned with interests (e.g. reading, music, family and social support, etc)

## Postoperative Disposition

- Post anesthesia care unit
- Discharge home if satisfactory pain control, coordinate buprenorphine dosing plan with prescriber
- Inpatient floor admission as applicable
- Consider ICU admission if uncontrolled pain and respiratory concerns

# Multi-modal tx

Preoperative	Intraoperative	Postoperative
Provide preoperative education	Non-Opioid Medications <ul style="list-style-type: none"> <li>– Ketamine</li> <li>– Lidocaine Infusion</li> <li>– Acetaminophen</li> <li>– NSAIDs</li> <li>– Gabapentinoids</li> <li>– Magnesium</li> <li>– Dexmedetomidine</li> <li>– Esmolol</li> <li>– Muscle Relaxants</li> </ul>	Clinical Opiate Withdrawal Scale monitoring and medications to treat opioid withdrawal symptoms (see Table 3)
Manage patient expectations		Acute pain service consultation
Consider preoperative pain consultation		Non-pharmacologic: <ul style="list-style-type: none"> <li>– Mindfulness Training</li> <li>– Cognitive Behavioral Therapy</li> <li>– Support Groups (e.g. Narcotics Anonymous)</li> <li>– 12 Step Group Therapy</li> <li>– Relaxation Strategies/ “Apps”</li> <li>– Acupuncture</li> </ul>
Coordinate care with MOUD provider or consider referral for OUD treatment	Local infiltration by surgical team	Topicals (ice, lidocaine ointment, lidocaine patches)
Involve family/support person, peer support, behavioral or counseling support as indicated	Regional Anesthesia Techniques <ul style="list-style-type: none"> <li>– Spinal Opioid Injection (Morphine/Hydromorphone)</li> <li>– Epidural Catheter (Local Anesthetic +/- Opioid)</li> <li>– Peripheral Nerve Block (single shot vs continuous catheter)</li> </ul>	Discharge planning with MOUD provider
Optimize nutrition/hydration		Overdose Prevention Education and Nasal Naloxone Prescription (OPENP)

# How do I Taper?

> *Reg Anesth Pain Med.* 2020 Jun;45(6):474–478. doi: 10.1136/rapm-2020-101324. Epub 2020 Mar 31.

## Implementation of a patient-specific tapering protocol at discharge decreases total opioid dose prescribed for 6 weeks after elective primary spine surgery

Sarah S Joo<sup>1</sup>, Oluwatobi O Hunter<sup>2</sup>, Mallika Tamboli<sup>1 2</sup>, Jody C Leng<sup>1 2</sup>, T Kyle Harrison<sup>1 2</sup>, Kate Kassab<sup>3</sup>, Jody D Keeton<sup>3</sup>, Stephen Skirboll<sup>3 4</sup>, Suzanne Tharin<sup>3 4</sup>, Emam Saleh<sup>3 4</sup>, Seshadri C Mudumbai<sup>1 2</sup>, Rachel R Wang<sup>1 2</sup>, Alex Kou<sup>1 2</sup>, Edward R Mariano<sup>5 2</sup>

Affiliations + expand

PMID: 32238478 DOI: 10.1136/rapm-2020-101324

Tapering Instructions (Prescribed As-Needed)							
Prior 24-hour Oxycodone (mg)	Days 1-2	Days 3-4	Days 5-6	Days 7-8	Days 9-10	Days 11-12	Total Oxycodone 5 mg Tablets Prescribed (n)
10 mg	5 mg twice daily						4
20 mg	5 mg four times daily	5 mg twice daily					12
30 mg	5 mg six times daily	5 mg four times daily	5 mg twice daily				24
40 mg	10 mg four times daily	10 mg three times daily	5 mg four times daily	5 mg twice daily			40
50 mg	10 mg five times daily	10 mg four times daily	10 mg three times daily	5 mg four times daily	5 mg twice daily		60
60 mg	10 mg six times daily	10 mg five times daily	10 mg four times daily	10 mg three times daily	5 mg four times daily	5 mg twice daily	84

Figure 1 Discharge opioid prescribing and tapering protocol based on each patient's prior 24-hour oral opioid use.

JOURNAL ARTICLE

## A Multidisciplinary Patient-Specific Opioid Prescribing and Tapering Protocol Is Associated with a Decrease in Total Opioid Dose Prescribed for Six Weeks After Total Hip Arthroplasty <sup>FREE</sup>

Mallika Tamboli, Edward R Mariano, MD, MAS ✉, Kerianne E Gustafson, PA-C, Beverly L Briones, NP, Oluwatobi O Hunter, DNP, AG-ACNP, Rachel R Wang, MD, T Kyle Harrison, MD, Alex Kou, Seshadri C Mudumbai, MD, MS, T Edward Kim, MD ... Show more

*Pain Medicine*, Volume 21, Issue 7, July 2020, Pages 1474–1481,

<https://doi.org/10.1093/pm/pnz260>

Published: 09 November 2019

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# Summary

- Perioperative pain management can be achieved in pt's on Buprenorphine for analgesia or OUD
- Continuation of Buprenorphine is recommended
- Use of Multi-modal analgesia is encouraged
- If additional opioids or increase in buprenorphine occurred, provide taper back to preoperative dose
- Pt education is important